

AMENDMENTS TO THE CLAIMS:

The following listing of claims replaces all prior versions, and listings, of claims in the application:

1 (currently amended). An electrically-bent endoscope, comprising:

a motor for generating a driving force;

a gear train for transmitting the driving force generated by the motor, the gear train having a plurality of gears;

a converting member for converting the driving force of the motor to a back and forth movement of a bending operation member for bending a bending portion provided at [the] a head side of] an inserting portion, the converting member and a final level of the gear train being mounted about a common axis; [and]

[a clutch mechanism having] a transmitting member for connecting and disconnecting the gear train and the converting member, the driving force being transmitted from the final level of the gear train to the converting member when the transmitting member is connected to the gear train and the converting member;

a thrust mechanism for moving the transmitting member in [the] an axial [direction relative to of the converting member] of the axis; and

[a clutch] an operating member, connected to the thrust mechanism, for inputting instructions for connecting and disconnecting between the gear train and the converting member, [the clutch mechanism connecting and disconnecting the driving force transmitted from the gear train to the converting member].

2 (cancelled)

3 (cancelled)

4 (currently amended). An electrically-bent endoscope according to Claim 1,

wherein the motor, the gear train, the converting member, the transmitting member and the thrust mechanism [and the clutch mechanism] are provided in a gearbox.

5 (original). An electrically-bent endoscope according to Claim 1,

wherein a pinion engaging with the gear train is press-fitted into a motor axis of the motor.

6 (original). An electrically-bent endoscope according to Claim 1, further comprising a first detector for detecting a rotating position of the converting member.

7 (currently amended). An electrically-bent endoscope according to Claim 3,

wherein the thrust mechanism has a cam mechanism including a cam pin provided at a shaft to be rotated in response to a manipulation of the operating member, [on the clutch operating member,] a cam, provided in the transmitting member, having a cam slot for fitting the cam pin, and a guide member for preventing the rotation of the cam.

- 8 (original).** An electrically-bent endoscope according to Claim 4,
wherein the gearbox is coated with a heat transmitting agent on the side facing toward the motor and also functions as a heat sink.
- 9 (original).** An electrically-bent endoscope according to Claim 6, further comprising:
a second detector for detecting a rotating position of the motor axis, a comparison unit for comparing information from the first detector and information from the second detector in order to detect the bending limit of the bending portion, and a warning unit for warning an operator based on the comparison result by the comparison unit.
- 10 (original).** An electrically-bent endoscope according to Claim 6,
wherein a gear engaging with the sprocket contains aluminum in the first detector.
- 11 (currently amended).** An electrically-bent endoscope according to Claim 6,
wherein the transmitting member and the thrust mechanism constitute a clutch mechanism, and the clutch mechanism is provided in the gear box such as to be [is] detachable from the [gearbox] gear train.
- 12 (original).** An electrically-bent endoscope according to Claim 7,
wherein the transmitting member has driving force transmitting pins for moving in the longitudinal axis direction of the shaft in response to the operation of the cam mechanism and being inserted to holes in the final level of the gear train and the converting member such that driving force transmitted from the final

level of the gear train to the converting member can be connected and be disconnected.

13 (original). An electrically-bent endoscope according to Claim 9, further comprising a control portion for terminating the motor when the comparison unit detects that the bending portion reaches the bending limit.

14 (original). An electrically-bent endoscope according to Claim 9,
wherein the motor and the second detector are detachable from the gearbox.

15 (original). An electrically-bent endoscope according to Claim 10,
wherein the gearbox covers the gear train.

16 (currently amended). An electrically-bent endoscope according to Claim 12,
wherein the guide member [of the clutch mechanism] also functions as a positioning flange for preventing the rotation of the cam in the transmitting member.

17 (currently amended). An electrically-bent endoscope according to Claim 14,
wherein the transmitting member and the thrust mechanism constitute a clutch mechanism, and the clutch mechanism is provided in the gearbox such as to be [is] detachable from the [gearbox] gear train.

18 (currently amended). An electrically-bent endoscope according to Claim 16,

wherein the transmitting member and the thrust mechanism constitute a clutch mechanism, and the clutch mechanism is provided in the gearbox such as to be [is] detachable from the [gearbox] gear train.

19 (currently amended). An electrically-bent endoscope, comprising:

a motor for generating a driving force for bending a bending portion provided at [the head portion of an inserting portion] an insertion portion;
a gear train for transmitting the driving force generated in the motor;
a sprocket for converting the driving force of the motor to a back and forth movement of a bending operation [wires] wire, the sprocket and a final level of the gear train being mounted about a common axis for rotation; [and]

[a clutch mechanism having] a transmitting member for connecting and disconnecting the final level of the gear train and the sprocket, the driving force being transmitted from the final level of the gear train to the sprocket when the transmitting member is connected to the gear train and the sprocket [which are provided coaxially];[,]

a thrust mechanism for moving the transmitting member back and forth in [the] an axial direction of the axis for rotation in order to connect and disconnect the final level of the gear train and the sprocket; and

a clutch operation knob, connected to the thrust mechanism, for inputting instructions for connecting and disconnecting between the gear at the final level of the gear train and the sprocket.

20 (original). An electrically-bent endoscope according to Claim 17,

wherein the thrust mechanism is a cam mechanism including a cam pin provided at a shaft rotating in response to a manipulation on the clutch operation knob, a cam having, in the transmitting member, a cam slot to which the cam pin freely fits, and a slide guide for preventing the rotation of the cam,

wherein the transmitting member moves back and forth in the longitudinal axis direction of the shaft in response to an operation of the cam mechanism and has one or more driving force transmitting pins for removably connecting and disconnecting the final level of the gear train and the sprocket,

wherein the final level of the gear train has one or more through portions through which the driving force transmitting pins of the transmitting member are inserted,

wherein the sprocket has one or more hole portions to which the driving force transmitting pins through the final level of the gear train fit.

21 (currently amended). An electrically-bent endoscope, comprising:

a motor for generating a driving force;

a driving force transmitting portion for transmitting the driving force generated [in] by the motor, the driving force transmitting portion having an output member mounted to a shaft for outputting the transmitted driving force;

a converting portion for converting the driving force of the motor outputted by an output member to a back and forth movement of a bending operation member for bending a bending portion provided at [the head of an inserting] an insertion portion;

[a clutch portion including] a transmitting member for connecting and disconnecting the output member [driving force transmitting portion] and the converting portion[,];

a thrust portion for moving the transmitting member in [the axis] an axial direction of the shaft in order to connect and disconnect the output member and [of] the converting portion[,]; and

an operating portion, connected to the thrust portion, for inputting instructions for connecting and disconnecting between the driving force transmitting portion and the converting portion[, the clutch portion connecting and disconnecting driving force transmitted from the driving force transmitting portion to the converting portion].

22 (currently amended). An electrically-bent endoscope, comprising:

a motor;

driving force transmitting means for transmitting a driving force generated [in] by the motor, the driving force transmitting means having an output member mounted to a shaft for outputting the transmitted driving force;

converting means for converting the driving force of the motor to a back and [force] forth movement of a bending operation member for bending a bending portion provided at [the head of] an [inserting] insertion portion of the endoscope;

[clutch means including] a transmitting member for connecting and disconnecting the driving force transmitting means and the converting means[,];

means for moving the transmitting member in [the axis] an axial direction of the shaft in order to connect and disconnect the output member and [of] the converting means[,]; and

operating means, connected to the means[,] for moving the transmitting member, for inputting instructions for connecting and disconnecting between the driving force transmitting means and the converting means[inputting instructions for connecting and disconnecting the driving force transmitting means and the converting means, the clutch means connecting and disconnecting driving force transmitted from the driving force transmitting means to the converting means].

23 (new). An electrically-bent endoscope, comprising:

a motor for generating a driving force;

a gear train for transmitting the driving force generated by the motor;

a converting member for converting the driving force of the motor to a back and forth movement of a bending operation member for bending a bending portion of an inserting portion of the endoscope at a head side of the inserting portion;

a clutch mechanism having a transmitting member for connecting and disconnecting the gear train and the converting member, the clutch mechanism connecting and disconnecting the driving force transmitted from the gear train to the converting member;

a thrust mechanism for moving the transmitting member in an axial direction relative to of the converting member; and

a clutch operating member, connected to the thrust mechanism, for

inputting instructions for connecting and disconnecting between the gear train and the converting member, wherein a final level of the gear train and the transmitting member are provided coaxially, and the thrust mechanism has a cam mechanism including a cam pin provided at a shaft to be rotated in response to a manipulation on the clutch operating member, a cam provided in the transmitting member, the cam having a cam slot for fitting the cam pin, and a guide member for preventing rotation of the cam.

24 (new). An electrically-bent endoscope according to Claim 23,

wherein the transmitting member has a driving force transmitting pins for moving in the longitudinal axis direction of the shaft in response to the operation of the cam mechanism and being inserted to holes in the final level of the gear train and the converting member such that driving force transmitted from the final level of the gear train to the converting member can be connected and be disconnected.

25 (new). An electrically-bent endoscope according to Claim 24,

wherein the guide member of the clutch mechanism also functions as a positioning flange for preventing the rotation of the cam in the transmitting member.

26 (new). An electrically-bent endoscope according to Claim 25,

wherein the clutch mechanism is detachable from a gearbox in which the motor, the gear train, the converting member and the clutch mechanism are provided.

27. (new) An electrically-bent endoscope according to Claim 11, wherein the gear box has an opening to remove the transmitting member and the thrust mechanism from the gear box.

28. (new) An apparatus for bent-driving an endoscope, comprising:

a gear train for transmitting driving force generated by a motor, the gear train having a plurality of gears;

a converting member for converting the driving force of the motor to a back and forth movement of a bending operation member for bending a bending portion provided at an insertion portion of the endoscope, the converting member and a final level of the gear train being mounted about a common axis;

a transmitting member for connecting and disconnecting the gear train and the converting member, the driving force being transmitted from the final level of the gear train to the converting member when the transmitting member is connected to the gear train and the converting member;

a thrust mechanism for moving the transmitting member in an axial direction of the axis; and

an operating member connected to the thrust mechanism for inputting instructions for connecting and disconnecting between the gear train and the converting member.